In the United States Patent and Trademark Office

Serial No. ________

Appn. Filed : _______

Applicant: Victor Faybishenko and Ashley Burfield

Appn. Title: HEAT-TRANSFER INTERFACE DEVICE BETWEEN A SOURCE OF HEAT AND A HEAT-RECEIVING OBJECT

Examiner/GAU: ____________________

Mailed:

At: San Carlos, CA

Information Disclosure Statement

Assistant Commissioner for Patents

Washington, District of Columbia 20231

Sir:

Attached is a completed Form PTO-1449 and copies of the pertinent parts of the references cited thereon. Following are comments on references pursuant to Rule 98:

U.S. Patent No. 6,422,172 issued in 2002 to J. Tanaka, et al. discloses an ICP reactor with a flat spiral RF coil placed onto the top of the plasma reactor. Reactors of this type are also described in "Industrial Plasma Engineering" by J.

Reece Roth, Vol. 1, Institute of Physics Publishing, 1995, pp. 412-413. The RF coils of this ICP reactor work under very severe thermal-exchange conditions required for removal of the excessive heat. In existing devices of the aforementioned type the thermal interface between the heat source and the heat-receiving object is carried out either through rigid contact or by utilizing thermally conductive elastic insulators such as, e.g., T-gon 200 Series insulators produced by Thermagon, Inc., OH, USA. However, the best thermally conductive elastic insulators of the aforementioned type are rated maximum to 200°C and therefore are not applicable for high-temperature applications such as those close to 350°C. The different in coefficients of thermal expansion between the materials of the mating parts in the thermal interface causes significant relative displacements, e.g., between RF coil and the reactor cover, and this results in violation of the plasma distribution pattern on the treated object, such as a semiconductor substrate. Another consequence of such differences in coefficients of thermal expansion is thermal warping of the contacting parts.

It should be noted that in apparatuses such as RF plasma reactors that utilize vacuum in working chambers the vacuum generate an additional force acting in the direction of violation of the interface. The above condition is aggravated with the raise of the working temperature whereby the sagging of the vacuum chamber walls is increased.

The applicant is not aware of any existing heat-transfer devices that maintain stable heat-transfer contact between parts subject to significant thermal deformations and operating under temperatures up to 350°C.

Thus, none of the references known to the applicants discloses, as claimed in our main Claim 1 with dependant Claims 2 to 39, a method for controlling and stabilizing heat-transfer conditions between a source of heat and a heat-receiving object that consists in providing a heat-transfer interface device in the form of an elastomeric material filled with an electrically-nonconductive and thermally-

conductive filler, providing the heat-transfer elastomeric device a space that can be filled with the elastomeric material during redistribution of this material under the effect of thermal deformations, and using the elastomeric device in a compressed state, the device at working temperatures up to 320°C, the elastomeric materials comprising a perfluoroelastomer polymer, and the filling materials being selected from boron nitride, aluminum nitride, beryllium oxide, and carbon. Furthermore, none of the references known to the applicants discloses, as claimed in our main Claim 40 and dependant Claims 41 to 75, an heat-transfer interface device for use in a range of working temperatures up to 320°C, which made from an elastomeric material filled with an electrically-nonconductive and thermally-conductive filler material, said elastomeric material being located between a source of heat and a heat-receiving object, the elastomeric material being compressed and having a slot or another free space for redistribution of the material under the effect of thermal deformations, the elastomeric materials comprising a perfluoroelastomer polymer, and the filling materials being selected from boron nitride, aluminum nitride, beryllium oxide, and carbon.

October 2/2003

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PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Victor Paybishenko
Art Unit	
Examiner Name	
Attorney Docket Number	

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	US-6422172	2002	J. Tanaka et al.	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code3 -Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Victor Faybishenko
Art Unit	
Examiner Name	
Attorney Docket Number	

Sheet 2 of 2

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	2.	"Industrial Plasma Engineering" by J. Reece Roth, Vol. 1, Institute of physics publishing, 1995, pp. 412-413	
	3.	T-gon 200 Series Insulators of Thermagon, Inc., OH, USA	
	4.	Catalogs of Mold-Tech, Standex-Engraving group	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.
This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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